

**ALLIGATOR GAR *ATRACOSTEUS SPATULA* AND ST. CATHERINE CREEK
NATIONAL WILDLIFE REFUGE**

A Report

Prepared for Bob Strader, Refuge Manager
St. Catherine Creek National Wildlife Refuge
Sibley, Mississippi

by
John J. Barker
August, 2010

INTRODUCTION

The alligator gar, *Atractosteus spatula*, is a member of the Lepisosteidae family of fishes and is one of the largest freshwater fish species in North America. They can live for 50 years and reach lengths up to 10 feet and weights of more than 300 pounds. The alligator gar is distinguished by its wide, alligator-like head with two rows of large teeth in the upper jaw. Alligator gar possess elongated, cylindrical bodies covered with thick, diamond-shaped and interlocking ganoid scales that provide an excellent barrier of protection from potential predators (Kayla). The dorsal and anal fins are positioned nearly opposite of one another far back on the body near the caudal fin. Their coloration is dark olive to brown dorsally fading into white ventrally.

Alligator gar inhabit large, slow-moving water bodies including bayous, oxbow lakes, rivers and backwaters. They can also tolerate waters with relatively high salinity content and are thus found along the Gulf of Mexico in saline bays and estuaries. They possess a highly vascularized, physostomous swim bladder allowing them to gulp or “breath” air and to survive in much more hypoxic waters than most freshwater fishes. Alligator gar pose little threat to humans, but they do produce toxic eggs (Kayla).

Over the past several years, the alligator gar has become a very popular fish. Anglers pursue trophy gar with bow-and-arrow and hook-and-line, commercial fishermen capture them in nets and on hook-and-line to fill a growing market for their tasty meat, and their scales can be found for sale online in the arts-and-crafts and jewelry trade. From a biological standpoint, there is hope that large alligator gar may be helpful in keeping populations of the invasive silver carp in check (Memphis paper). Alligator gar routinely prey on large fish, and there is evidence they have an affinity for the Asian carp.

DECLINE OF THE ALLIGATOR GAR

Historically, the alligator gar ranged throughout the Mississippi River and its tributaries from the lower portions of the Ohio and Missouri Rivers southward to the Gulf of Mexico (Ferrara). Their range also included Gulf Coast drainages from the Choctawhatchee River in Florida to rivers of northern Mexico (ferrara). Unfortunately, their range and overall numbers have declined over the last few decades. Substantial populations are now largely limited to Louisiana, the southern portion of Mississippi, and the eastern half of Texas (Figure 1). In six states where the alligator gar existed historically, they are now considered rare or extirpated (Buckmeier). Even in areas where substantial numbers still exist, there seems to be a shift in size and age structure toward smaller, younger individuals (ferrara).

Several factors seem to be contributing to the alligator gar's decline. In the past, there has been a tendency to view all gar as trash fish, and there existed substantial encouragement to kill and dispose of as many gar as possible (Kayla). This view was reinforced by the belief that large gar consume a detrimental number of sport fish (Leon). In reality, alligator gar are opportunistic feeders that consume large quantities of nongame fishes and crustaceans (Kayla) as well as birds, reptiles, amphibians and small mammals (adhoc).

The emerging popularity of the alligator gar for food and sport has generated increased fishing pressure as well. A quick internet search returns abundant images, videos, and how-to information concerning bowfishing for alligator gar (personal observation). Commercial exploitation is apparent in the United States with an average of over 520,000 pounds per year having been sold in the state of Louisiana alone over an

eight-year period, 1999-2006 (Kayla). Furthermore, Leon (2001) reports that the alligator gar is highly valued as a food source in northeastern New Mexico.

Habitat depletion and alteration are likely significant contributors to the decline of the alligator gar (ferrara). They heavily utilize backwaters in floodplain areas for spawning and nursery purposes, and many of these type areas have been modified or rendered inaccessible by the construction of dams, levees (Ferrara), and roads (Inebnit).

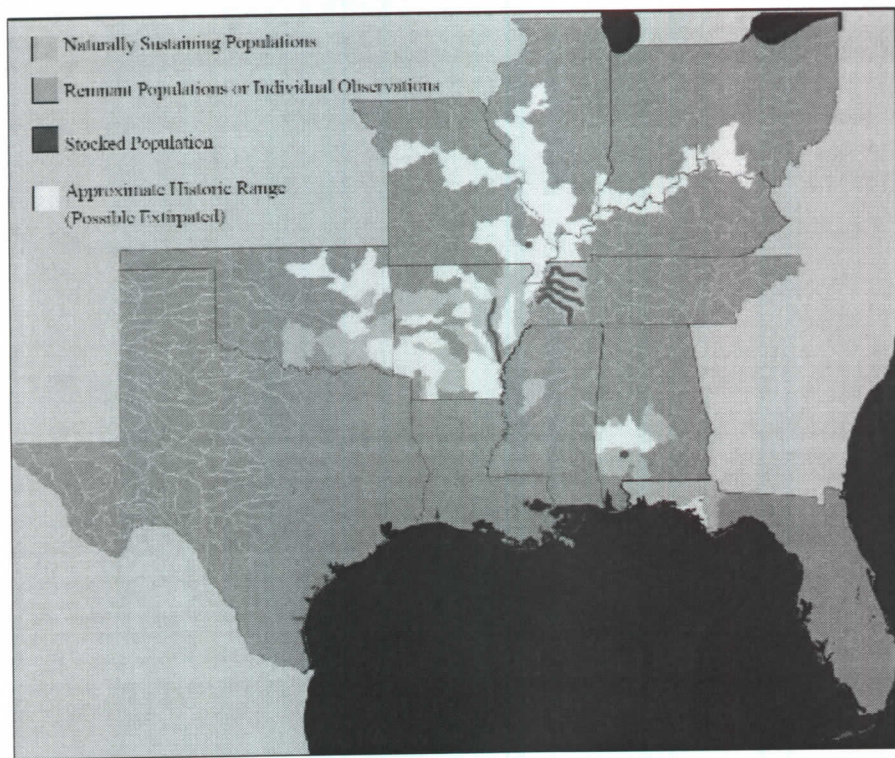


Figure 1. Current and historic distributions of alligator gar (USFWS, 2009)

LIFE HISTORY

Alligator gar are a long-lived species that exhibit high fecundity (ferrara) and provide no parental care for their young (Todd). Female alligator gar become sexually mature at 10-14 years of age, whereas males mature by age five (Ferrara). There is some

evidence, however, that many females mature by age five (Kayla). Spawning generally takes place from April to June in shallow areas of floodplain backwaters and tributaries. Unlike other times of the year, spawning season prompts gregarious behavior among alligator gar (Mendoza). Small groups consisting of one female and several males split off from larger spawning aggregations and move into very shallow waters (Mendoza). The female and one of the males simultaneously broadcast eggs and sperm over submerged vegetation (clay), and the adhesive eggs attach to the vegetation where they hatch within 48-72 hours (adhoc). Adult males and females depart soon thereafter (Leon). Ferrara (2001) documented an average of 157,000 eggs per female but found their fecundity to be highly variable between individuals. Alligator gar eggs are moderately large, ranging from 3-5 mm in diameter (Alfaro).

Newly hatched alligator gar larvae are approximately 7 mm total length (TL) and derive nutrition from a yolk sac for the first eight days (Aguilera). For the first four days the larvae remain adhered to the vegetation and are strictly lecithotrophic, meaning they receive nutrition only from the yolk sac (Alfaro). During this period the larvae grow to approximately 13.5 mm TL. From 5-8 days after hatch (DAH) the larvae detach from their original positions on the vegetation and become free-swimming and lecithoexotrophic, meaning they begin feeding exogenously while still deriving some of their nutrition from the yolk sac. The larvae are then able to reattach themselves to vegetation and other debris and structures in the water where they hang vertically via a suckorial disk on their snout for extended periods of time (Echelle). During this period, the gar larvae reach approximately 22 mm TL while “weaning” themselves off the yolk sac (Alfaro). By 8 DAH the larvae are entirely exotrophic and soon cease to hang

vertically, being able then to rest motionless in a horizontal position at any depth (echelle). Estimated growth rates for alligator gar larvae are 1.55 mm/day at 0-10 DAH and 5.06 mm/day at 10-15 DAH (Aguilera). By 15 DAH alligator gar larvae can measure over 48 mm TL (Aguilera).

During early exotrophic stages of growth, young gar feed on a variety of organisms including small crustaceans, insects and fishes (echelle). From 115-306 mm TL, their primary diet becomes fish supplemented by a few insects (echelle). Young gar grow very quickly, and commonly reach lengths of 10-12 inches within the first year after hatch (adhoc). Young of year alligator gar have been documented to increase in weight by 1.8 kg in just over 3 months (Buckmeier). Older individuals grow much slower; consequently, alligator gar take approximately 10 years to reach 1 m TL and 30 years or more to reach 2 m TL (Buckmeier).

Backwater spawning areas likely double as nurseries for the juvenile gar for an extended period of time (Buckmeier). As they develop, juveniles spend large amounts of time during daylight hours resting motionlessly near submerged or overhanging objects and become more active at night in shallow, open waters (echelle).

THE ROLE OF ST. CATHERINE CREEK

St. Catherine Creek National Wildlife Refuge was established in 1990 and consists of 24,442 acres situated just south of Natchez, Mississippi in the counties of Adams and Wilkinson (St. Cat. Website). The Refuge is bordered on the west by the Mississippi River in a scenario that provides ideal spawning and nursery habitat for the alligator gar (Campbell). The Refuge consists of a unique combination of mixed pine/hardwood uplands, hardwood river-bottoms, and agricultural fields (personal

observation). The lack of a levee on east side of the Mississippi River in that locale allows for seasonal inundations of the floodplain by River backwaters, permitting the system to act in much the same way the entire Mississippi floodplain did before the levee system of the 1920's (Campbell). The pulse and durations of the seasonal floods on St. Catherine Creek NWR are optimal for alligator gar to spawn (Campbell). This unique situation affords concerned biologists a number of valuable opportunities.

Over the past ten years on the Refuge, biologists have captured an estimated 200-400 adult alligator gar weighing anywhere from 20-200 lbs and have taken them back to the Private John Allen National Fish Hatchery in Tupelo, Mississippi where the females were allowed to spawn (Campbell). Tens of thousands of juvenile gar have been stocked in suitable areas up and down the Mississippi River Basin, and all of them have been produced using brood stock from St. Catherine Creek Refuge (Campbell). Such stocking efforts are likely critical to the broad restoration of the alligator gar to its historic range (Ferrara). An estimated 6000-10,000 (needs updated numbers) will be stocked in 2010 (Campbell), and thousands more likely will be stocked in the years to come.

The Refuge is also being utilized to determine the spawning habits and preferences of the alligator gar. In the spring of 2010, U.S. Fish and Wildlife biologists tagged 20 alligator gar with five-year, radio-telemetry transmitters and released them in order to track their movements before, during, and after the spawn (Kayla interview). Receivers were strategically placed in areas frequented by the gar, and each time a tagged gar comes within range of the receiver, it records the tag number of the fish, the date and the time (Kayla interview). It is believed the gar use Butler Lake on the Refuge as a pre-spawn staging area and that they move into the shallow, flooded agricultural fields to

spawn, but more study is needed to confirm this suggestion (Kayla interview). Biologists intend to use these tracking methods to determine if or when adult gar move back into the Mississippi River and if they leave and return year to year (Kayla interview). The objective of these studies is to determine what makes St. Catherine Creek Refuge a model habitat and then use that information to identify other model habitats in the Mississippi River Basin that can be maintained or developed for the alligator gar (Campbell). This is another significant component of restoring the alligator gar to its historic range (Ferrara).

At St. Catherine Creek Refuge, steps are being taken to protect the alligator gar and its vital habitats. The taking of alligator gar has been prohibited on the Refuge for several years (Strader interview). Furthermore, Refuge personnel will be monitoring how silt from hillside erosion is impacting spawning areas (Strader interview). The extra attention is warranted because of the critical role the Refuge is playing and will continue to play in efforts to restore the alligator gar (Strader interview).